WHAT IS CLAIMED IS:

1. An illuminating-reflector system for transmitting a frequency band in an dispersed beam and a substantially collimated beam, the system comprising:

a secondary reflector configured to transmit a first portion of the frequency band to form the dispersed beam and to reflect a second portion of the frequency band; and

a primary reflector configured to receive the second portion of the frequency band reflected from the secondary reflector and to reflect the second portion of the frequency band to form the substantially collimated beam.

2. The system of claim 1, further comprising a dispersive lens configured to receive the frequency band and transmit the frequency band to the secondary reflector in another dispersed beam.

3. The system of claim 2, wherein the primary reflector includes an aperture formed therein to pass the frequency band from the dispersive lens to the secondary reflector.

4. The system of claim 2, wherein the dispersive lens is configured to receive the frequency band from a beam waveguide.

5. The system of claim 1, wherein the first portion includes about twenty percent or less of the power of the frequency band.

6. The system of claim 1, wherein the second portion includes about eighty or more of the power of the frequency band.

7. The system of claim 1, wherein the frequency band includes a V-band or a W-band.

8. The system of claim 7, wherein the V-band and the W-band respectively include a Military Satellite Communications V-band and a Military Satellite Communications W-band.

9. The system of claim 1, wherein the primary reflector has a diameter greater than or equal to about six feet and less than or equal to about eight feet.

10. The system of claim 1, wherein the secondary reflector has a diameter of greater than or equal to about 8 inches.

11. The system of claim 10, wherein the secondary reflector has a diameter of about 12 inches.

12. The system of claim 1, wherein the secondary reflector is a compound optical element.

13. The system of claim 1, wherein a gain of the primary reflector is greater than or equal to about 50 dBi.

14. The system of claim 1, wherein a gain of the primary reflector is about 59.5 dBi.

15. The system of claim 1, wherein a gain of the secondary reflector is less than or equal to about -33 dBi below the primary beam.

16. The system of claim 1, further comprising control electronics disposed in a satellite bus and configured to control a transmission direction of the dispersed beam and the substantially collimated beam.

17. The system of claim 1, wherein the dispersed beam is configured to be acquired by a satellite for initial acquisition and automatic tracking of the system.

18. A satellite for cross-link communications with at least one other satellite, the satellite comprising:

an illuminating reflector configured to transmit a first portion of a frequency band in a collimated beam and a second portion of a frequency band in an dispersed beam.

19. The satellite of claim 18, wherein the dispersed beam is a low-gain beam.

20. The satellite of claim 18, wherein the collimated beam is a high-gain beam.

21. The satellite of claim 18, wherein the illuminating reflector includes:

a secondary reflector configured to transmit the first portion of the frequency band to form the dispersed beam and to reflect a second portion of the frequency band; and

a primary reflector configured to receive the second portion of the frequency band reflected from the secondary reflector and to reflect the second portion of the frequency band to form the substantially collimated beam.

22. The satellite of claim 18, wherein the dispersed beam is configured to be acquired by another satellite for initial acquisition and automatic tracking of the first-mentioned satellite.

23. The satellite of claim 18, further comprising a dispersive lens configured to receive the frequency band from a beam waveguide and transmit the frequency band to the secondary reflector.

24. The satellite of claim 23, wherein the primary reflector includes an aperture formed therein to pass the frequency band transmitted from the dispersive lens to the secondary reflector.

25. The satellite of claim 23, wherein the dispersive lens configured to receive the frequency band from a beam waveguide.

26. The satellite of claim 23, wherein the first portion includes about five percent or less of the power of the frequency band transmitted from the dispersive lens.

27. The satellite of claim 23, wherein the second portion includes about ninety-five percent or more of the power of the frequency band transmitted from the dispersive lens.

28. The satellite of claim 18, wherein the frequency band includes a W-band.

29. The satellite of claim 28, wherein the W-band includes a Military Satellite Communications W-band.

30. The satellite of claim 18, wherein the primary reflector has a diameter greater than or equal to about six feet and less than or equal to about eight feet.

31. The satellite of claim 18, wherein the secondary reflector has a diameter greater than or equal to about eight inches.

32. The satellite of claim 18, wherein a gain of the primary reflector is greater than or equal to about 59 dBi.

33. The satellite of claim 32, wherein the gain of the primary reflector is about 59.5 dBi.

34. The satellite of claim 18, wherein a gain of the secondary reflector is less than or equal to about -33 dBi below the primary beam.

35. The satellite of claim 18, further comprising a satellite bus operatively coupled to the illuminating reflector.

36. The satellite of claim 35, further comprising control electronics disposed in the satellite bus and configured to slew the illuminating reflector.

37. A satellite communication method for cross-linked communication between satellites, the method comprising:

at a first satellite:

transmitting in an dispersed beam a first portion of a frequency band through a secondary reflector, wherein the secondary reflector is configured to form a portion of an illuminating reflector;

reflecting a second portion of the frequency band from the secondary reflector;

receiving at a primary reflector the second portion of the frequency band reflected from the secondary reflector, wherein the primary reflector is configured to form another portion of the illuminating reflector; and

reflecting at the primary reflector the second portion of the frequency band to form a substantially collimated beam.

38. The method of claim 37, wherein the primary reflector and the secondary reflector form a Cassegrain reflector.

39. The method of claim 37, further comprising:

at a second satellite:

acquiring the dispersed beam; and

tracking the dispersed beam to acquire the collimated beam.

40. The method of claim 39, further comprising transmitting a beacon signal from the second satellite to the first satellite to indicate acquisition of the collimated beam.

41. The method of claim 40, further comprising modulating the collimated beam for communications in response to receiving the beacon signal.

-- 42. The method of claim 39, wherein the frequency band is un-modulated prior to acquisition of the collimated beam by the second satellite.